

Development of Student Worksheets (LKPD) Based on Learning Models Guided Inquiry to Improve Students Critical Thinking Ability in Materials Cells and Plant Tissue Class XI SMA/MA



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ABSTRACT: This study aims to design, design and develop a learning intervention. The product developed is LKPD based on learning models *guided inquiry* to improve the critical thinking skills of students of SMAN 1 IX Koto Sungai Lasi that are valid, practical, and effective. The instrument used was a validity questionnaire and a practicality questionnaire as well as a matter of effectiveness. The validity and practicality data analysis technique uses a Likert scale scoring and the effectiveness uses a t-test using SPSS 2.2. Based on the development and trial of LKPD based on learning models *Guided Inquiry* on the material of plant cells and tissues to improve the thinking skills of class XI students of SMAN 1 IX Koto Sungai Lasi, it was concluded that the results of the validity and practicality tests met the very valid criteria. The results of the effectiveness test have effective criteria.

KEYWORDS: Guided inquiry, development, critical thinking.

I. INTRODUCTION

Learning is aspect (LKS). important in the implementation of education. Students are expected to be able to understand the concepts and principles of the material in the learning process. Teachers must be able to provide motivation and foster student interest in learning, and need to create a learning atmosphere that can help students understand concepts and learning materials. This can be done by using media, models and various approaches to facilitate students in the learning process (Suryono and Hariyanto, 2011: 18).

Media that can be help learning is teaching material. Teaching materials are an important part in the implementation of learning. Teachers who use teaching materials will find it easier to carry out learning and students will find it easier to understand learning materials. One of the teaching materials that can be used to assist teachers in carrying out learning process activities is LKPD. The teaching materials used by the teacher are in the form of textbooks, modules, and Student Worksheets (LKPD). The Student Worksheet was originally known as the student worksheet Student worksheets are sheets that contain assignments that must be done by students. LKPD is usually in the form of instructions, steps to complete a task, which will be achieved (Depdiknas, 2008: 18).

LKPD is one of the teaching materials that contains the main learning materials, as well as instructions for working on assignments that refer to the competencies that must be achieved by students. Presentation of important concepts in LKPD will be simpler for students (Prastowo, 2010: 204). This is in accordance with Trianto's statement (2009: 222), that LKPD is a student guide used to carry out investigations and problem solving activities. In addition, LKPD makes it easier for teachers to explain learning materials. This is in accordance with Prastowo's statement (2010: 24) that the function of teaching materials for teachers is to save time in teaching.

The results of the researcher's observations on the activity sheet contained in the student book found that the teacher had indeed used teaching materials in the form of LKPD, but the LKPD used was the LKPD designed by the teacher himself. LKPD These are only in the form of materials, questions and other sources as used. The LKPD contained in the reference book is only a description of the material and questions to strengthen certain concepts so that the LKPD has not been able to facilitate

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students in obtaining meaningful learning. The LKPD used is less attractive to students because it is not equipped with pictures. This causes students to be less interested in working on and reading LKPD.

The biology learning process at SMAN 1 IX Koto Sungai Lasi has not all produced good grades in the sense that there are still many students who do not meet the standards. in class XI which was set at SMAN 1 IX Koto Sungai Lasi, namely 79. The lack of use of learning models and teaching materials that did not facilitate students in critical thinking and solving problems resulted in the low learning outcomes of students.

Based on the results of the researcher's interview with the biology subject teacher (Appendix 3) who teaches at SMAN 1 IX Koto Sungai Lasi on October 11, 2020, it is known that when learning biology, the teacher uses the LKPD analysis made by the teacher at every meeting, however, it does not include activities and activities. clear directions. LKPD components used by teachers include titles, competencies, teaching materials and student activities. The LKPD used has several shortcomings, namely: first, LKPD is not yet model-based guided inquiry. Which second, is used to direct students to carry out practical activities and investigations without being preceded by directing students to a problem, LKPD does not provide a column for the results of the investigation and a column for concluding observations ,third LKPD has not directed students to think critically.

However, in reality, students' test results get unsatisfactory results as shown in Table 1.

Table 1. Number of Students and Average Grade XI MIPA I Test Semester 1 Academic Year 2020/2021 on Cell and Tissue Material.

Class	Mark flat ₂	Amount participant educate	Participant Educate complete (%)	Participant Educate no complete (%)
XI MIPA	67.00	23	60%	40%

Source: Biology Subject Teacher at SMAN 1 XI Koto Sungai Lasi.

Based on Table 1, it can be seen that students who complete have a percentage of 60% while those who do not complete 40%. The low learning outcomes are due to the presence of students who have not mastered the subject matter, students are also less directly involved in the learning process and students tend to be less daring in asking material that they do not understand, the skills of students in solving every problem in the classroom are still not satisfactory.

This is reinforced based on the results of researchers' observations during the online learning process, namely every time the teacher asks students a question on average only two or three students answer questions from the rest of the 23 students who just stay silent and take notes on the explanation given by the teacher. This condition can also be caused by the monotonous and unattractive learning style of a teacher at the time of teaching.

The implementation of learning which is still dominated by the teacher with the lecture method tends to be limited to the memorization aspect so that it does not involve the activities of students which causes students to have difficulty in mastering biological concepts and has an impact on low learning outcomes. To overcome these problems, teachers need to change the conventional learning model with new teaching methods that allow students to be actively involved directly in learning and further assist students in mastering biological concepts so as to achieve maximum learning outcomes..

One of the learning models that can be applied is guided inquiry (guided inquiry). Guided inquiry learning enable students to gain opportunities to expand knowledge and help develop conceptual understanding (Pandey et al, 2011: 3 and Wenning, 2011: 2). In guided inquiry learning, the teacher does not release students to carry out investigation activities, but the teacher actively provides direction and guidance (Kuhlthau et al, 2007: 3). With teacher guidance, students are expected to be able to concentrate on building new knowledge and benefit from each stage of the investigation process they do.

Problem whichfound in learning needs a solution so that students get good learning outcomes. Several possibilities that can be done by the teacher by applying a learning device made to focus and activate students in the learning process. Learning like this is a form of learning that trains and develops the ability of students to analyze a problem and make their own conclusions. Learning should be designed to follow the flow of the students' minds themselves who find the concepts contained in the material being taught.

The thinking process itself is usually carried out through questions and answers between teachers and students or vice versa. Starting from these questions, this is a form of learning guided inquiry carried out. This learning strategy is often also called a learning strategy heuristic. Which comes from the Greek, namely heuriskein which means I find. According to the benchmark of critical thinking ability, it must meet the indicators used.According to Fisher (2011), there are nine indicators of critical thinking

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including: (1) state truth statement or questions;(2) analyze statement or question; (3) logical thinking; (4) sorting for example cause and effect; (5) classify; (6) decide for example the evidence; (7) predict; (8) theorize; and (9) understand others and themselves. This is in accordance with what was stated by Marjono, et al (2012: 21).

that learning with the guided inquiry model makes students learn as thinkers, not just passive recipients of knowledge. The introduction and provision of problems that are relevant to everyday life for students, analytical to find and find answers to a problem by themselves, make students as scientific concept builders.

Learning that demands optimal involvement in the learning process can improve Latifa's critical thinking skills (2017: 66). This is in line with Synder & Snyder (2008: 94) which states that a learning environment that involves being active in investigating information and applying their knowledge improves critical thinking skills. It can be concluded that by using the learning model, guided inquiry can further improve students' critical thinking skills.

By using LKPD based on learning models guided inquiry All thoughts and skills of students can be directed to prove the concept of learning through a series of learning activities. This is in line with the results of Melsi's research (2018) which shows that learning activities with the learning model guided inquiry encourage students to be more active in the learning process and can improve understanding of material concepts by inquiry involving students in investigations (investigations), helping students identify conceptual or methodological problems in the investigation area, and asking students to design ways to solve problems (Kemendikbud, 2014) . Inquiry learning expects students to learn a scientist in exploring knowledge.

Based on this background, the researcher proposed the title "Development of Student Worksheets (LKPD) Based on Learning Models".Guided Inquiry to Improve Students' Critical Thinking Ability in Materials Cells and Plant Tissue Class XI SMA/MA”.

II. RESEARCH METHODS

This type of research is development research. The product developed is model- based LKPD guided inquiry to improve the critical thinking skills of students of SMAN 1 IX Koto Sungai Lasi that are valid, practical, and effective. The development model used in this study is the Plomp model, consisting of three stages, namely the initial investigation stage, the development stage or prototyping, and the assessment stage. The subject of the experiment was carried out on 23 students of class XI MIPA I and 1 biology teacher SMAN 1 IX Koto Sungai Lasi. The types of data in this study are qualitative and quantitative data. The instruments used in data collection were observation/ interview sheets, self-evaluation instruments, LKPD validity instruments, LKPD practical instruments, and LKPD effectiveness instruments. The validity and practicality data analysis technique uses a Likert scale scoring and the effectiveness uses a t-test using SPSS 2.2.

III. RESULTS AND DISCUSSION

Table 2. Results of Data Analysis of the Validity of Three Validators.

No	Aspec	Value %	Criteria
1.	Didactic	93.33	Very valid
2.	Construct	82.75	Very valid
3.	Technical	90.28	Very valid
Total		269.85	Very valid
Average		89.78	Very valid

Table 3. Small Group Evaluation Results.

No	Aspec	Value %	Criteria
1.	Convenience	88.89	Very Practical
2.	Efficiency	85.42	Very Practical
3.	Attractiveness	81.25	Very Practical
4.	Easy interpreted	86.11	Very Practical
5.	Own equivalence	89.58	Very Practical
Average Value Practical		86.50	Very Pracktical

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Table 4. Practicality Assessment by Teachers.

No	Aspec	Value %	Criteria
1.	Convenience	95.83	Very Practical
2.	Efficiency	100	Very Practical
3.	Attractiveness	91.67	Very Practical
4.	Easy interpreted	87.50	Very Practical
5.	Own equivalence	87.50	Very Practical
Average Value Practical		92.50	Very Pracktical

Table 5. Results of Practical Data Analysis by Students

No	Aspec	Value %	Criteria
1.	Convenience	86.41	Very Practical
2.	Efficiency	82.61	Very Practical
3.	Attractiveness	81.52	Very Practical
4.	Easy interpreted	81.52	Very Practical
5.	Own equivalence	86.41	Very Practical
Average Value Practical		83.70	Very Pracktical

Table 6. Critical Thinking Ability Assessment Results.

Class	N	Xmin	Xmax	Mean	Standar Deviation
Experimen	25	52	96	74.43	11.984
Control	25	48	84	61.91	10.435

Table 7. Prerequisite Test Results for Normality and Homogeneity of Critical Thinking Ability

No	Parameter	Significance	Information
1	Normality	0.200	Normal
2	Homogenity	0.576	Homogeneous

Table 8. Calculation Results of Critical Thinking Ability t-test.

Class	Significance	Information
Control	0.000	Ho ditolak
Eksperimen		

Test the validity of the LKPD based on the learning model Guided Inquiry aims to check the suitability of KI, KD, achievement indicators, learning objectives, suitability of image display with descriptions, and grammar in LKPD. Sugiyono (2013: 137-363) states that validation is the degree of accuracy between data that occurs in the object of research with actual data. Based on the LKPD validation test based on the learning model Guided Inquiry validated by three experts or experts. The developed LKPD validation is assessed by experts or experts from 3 aspects, namely didactic aspects, construction aspects and technical aspects. has been established. The description of the material presented has supported the achievement of indicators of competency achievement and learning objectives, and has supported the understanding of students' concepts. This is in accordance with the opinion of the Ministry of National Education (2008) that the preparation of materials in LKPD is very dependent on the KD to be achieved.

In addition, this LKPD also contains steps guided inquiry that is, learning activities in LKPD consist of stages of orienting students who are asked to listen explanation with displays a topic of learning material delivered by the teacher regarding activities and what students will do.

Ease of using LKPD based on learning models guided inquiry has very practical criteria. This is because this LKPD is very useful for adding insight to students, because through this LKPD it is simpler than printed books. According to Sukardi (2012), practicality can be seen from the implementation time which should be short, fast and precise. Then, the attractiveness aspect with very practical criteria LKPD has an attractive appearance so that the use of LKPD helps teachers and motivates students in learning because the problems given are related to everyday life related to the topic of plant cells and tissues.

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The effectiveness of LKPD is seen from the students' critical thinking skills obtained after students use the LKPD in the learning process. The results of the effectiveness assessment show that the developed worksheets are effectively used as teaching materials in the learning process, students' critical thinking skills are assessed through daily tests of cell and tissue material.

The instrument used is in the form of questions essay as many as 5 items, Testing the effectiveness of the LKPD was carried out using the t-test, because the data were normally distributed and homogeneous. Based on the t- test, the results obtained that the hypothesis is accepted. Therefore, it can be concluded that the use of LKPD based on the learning model *Guided Inquiry* on plant cell and tissue material that can effectively be used for learning On *Guided Inquiry* The teacher only presents the problems and materials needed while the students design their own steps to solve the problem. At the beginning of the inquiry, students design their own problems to be investigated. In learning biology related to scientific work, the teacher is very appropriate if he chooses and applies the method inquiry. The teacher uses this technique with the aim that students can be stimulated by the task, and actively seek and research problem solving themselves. Types of learning models *Guided Inquiry* this is very suitable for use.

At this stage, namely orientation, students are asked to listen to an explanation by presenting a topic of learning material presented by the teacher regarding the activities that will be carried out by students. the material presented in the LKPD is sourced from books and journals related to cell and tissue material.

In the next stage of formulating it she problem, at this stage, students are asked to formulate problems from the discourse that has been provided, it is hoped that later students can formulate problems properly and correctly. The problems presented raise the curiosity of students in learning. Students must be able to identify problems and make problem formulations from the discourse that has been given. This will stimulate the ability to think critically, logically, and systematically. The activity of formulating problems is also an important basis in the stages of *guided inquiry*. Based on the validity test, the three validators stated that the LKPD was based on the learning model *Guided Inquiry* which has been designed is included in the very valid category with a validity value of 89.78%.

LKPD based on learning model *Guided Inquiry* declared very valid because it has fulfilled four didactic, construct, technical, and language aspects, in terms of didactic aspects, LKPD based on learning models *Guided Inquiry* has been declared very valid by the validator with a value of 93.33%. This LKPD is in accordance with the applicable 2013 curriculum and can be used in the learning process. This LKPD has also been.

The results at the time of the study found differences in critical thinking skills in the treatment of the experimental class using LKPD based on the learning model *Guided Inquiry*. While in the control class using LKPD which is commonly used by teachers in learning. This is because the LKPD developed by the researcher has a learning model stage *Guided Inquiry* which can improve students' critical thinking skills. This is in line with Synder & Snyder (2008: 94) which states that a learning environment that involves being active in investigating information and applying knowledge they Upgrade critical thinking skills.

According to National Research Council disclose inquiry is a multiphase activity that involves making observations; asking question; check books and other sources of information to see what is already known; investigative planning; review what is already known in the light of experimental evidence; collect data, analyze, and interpret data; propose answers, explanations, and predictions; and communicate the results. Inquiry requires identification of assumptions, use of critical and logical thinking, and judgment alternative explanation.

According to Yamin (2012), critical thinking is a problem-solving ability that requires students to connect ideas that were previously studied for problem solving. At this stage students work (not just sit, listen and write) to find answers to the problems raised by the teacher under the incentive guidance of the teacher, then they are guided to find the best way to solve the problem.

The next stage is to propose a hypothesis at this stage students are asked to submit a hypothesis (answer temporary) from the formulation of the problem under study. Then students are asked to provide correct and accountable temporary answers.

Then the next stage is the stage of collecting data at this stage students are asked to conduct a reference study to examine the hypothesis that has been put forward. At this stage, students can see internet media or material topics that have been provided.

The next activity is the stage of testing the hypothesis at this stage students are asked to carry out experimental activities to prove the hypothesis that has been proposed. The most important thing in testing the hypothesis is to find the level of confidence students on the answers to the hypotheses they have formulated. This means that the truth of the answers given is not only based on arguments, but must be supported by data found and can be accounted for.

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Furthermore, the activities of the last stage of Guided Inquiry is to formulate Conclusions after carrying out experimental activities at the stage of testing the hypothesis, students are asked to make conclusions based on the observations that have been made. Ask students to present in front of the class and be able to take responsibility for what has been done.

IV. CONCLUSION

Based on the development and trial of LKPD based on learning models Guided Inquiry on the material of plant cells and tissues to improve the thinking skills of class XI students of SMAN 1 IX Koto Sungai Lasi, it was concluded that the results of the validity and practicality tests met the very valid criteria. The results of the effectiveness test have effective criteria.

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